BUILDING SUPPLY CHAIN CAPACITY BETWEEN URBAN AND REGIONAL AUSTRALIA THROUGH THE DEVELOPMENT OF INLAND RAIL: LESSONS FROM ABROAD

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ABSTRACT: The primary conduit for agricultural supply chain development throughout the eastern states of Australia has traditionally been via road. The development and delivery of the Inland Rail, due to commence in 2025, will provide a critical new infrastructure that will improve agricultural supply between major ports and regional hubs in those states. It will be a supplementary mode to roads throughout the eastern states, including northern Queensland, an innovative infrastructure approach that is similar to those that have been embraced across Asia and Europe.

This paper examines the typical options, rationale, benefits for the development and delivery of Inland Rail infrastructure projects using Hong Kong as a case study, where interviews were conducted with the Mass Transit Rail Corporation (MTRC). This provided the rationale and insights for the framework used in this study to enhance regional development and the development of value capture options. This paper further sets out how value capture may be applied in the context of current Inland Rail development through Parkes in New South Wales and the rationale for potentially expanding the Inland Rail through to Northern Queensland to open regional markets.

KEYWORDS: Value Capture, Inland Rail, Mass Transit Rail Corporation (MTRC), Economic Development

1. INTRODUCTION

The Inland Rail project has a construction period exceeding a decade and traverses three states along its 1700km route with an estimated cost of $9.7 billion (Australian Rail Track Corporation (ARTC), 2015). It is primarily funded by the Commonwealth government, with state governments and private partners funding the balance. While Commonwealth funding is

defined in the 2019 budget, the states and private sector will look to a number of options to co-fund the shortfalls. The remit of the states is the development of regional logistic distribution hubs, which could provide significant growth in surrounding property values. It is envisaged that such hubs will service new industries that will evolve from this regional growth and activity. In recent times, the increase in surrounding land values resulting from new infrastructure has been captured and recycled as a form of funding or partial funding of projects that generate an increase in value. This concept is known as value capture funding, which is defined by Smolka (2013, p. 8) as "the recovery by the public of the land value increments (unearned income or *plusvalias*) generated by actions other than the landowner's direct investments."

This concept has been developed and used in funding large scale rail projects abroad, including the Hong Kong and Mainland China link used for freight and passenger transport. The idea of value capture is one of the means of financing infrastructure to facilitate agriculture supply chain options.

Strengthening the economic status of regional Australia through the development of improved transport links to main cities and ports, as well as the development of an inland freight rail network, will mutually benefit both regional and urban Australia. The Regional Australia Institute (RAI) (2016, p. 8) broadly defines regional Australia as follows:

> The RAI uses 50,000 people as the threshold for regional cities that deliver 31 distinct small cities across Australia. While any threshold is imperfect, thispopulation level is important to both the economic diversity of the city and to the potential for agglomeration economies becoming the key driver of economic development.

As Australia is expecting population growth from 24 to 40 million in the next 50 years, small regional cities will form a growing and increasingly important connecting network of urban areas. In the national context, these areas stretch from Cairns in the north to Hobart in the south (RAI, 2016). By developing inland cities and their surrounding regions economically, transport infrastructure is a key factor driving economic stimulus. In Australia, the proposed Inland Rail will deliver such stimulus through its objectives that include regional development and sustainability. This is confirmed by the Australian Track Rail Corporation (ATRC) (2015, p. 8), which defines the two key challenges confronting regional economic growth and productivity as road congestion and the lack of alternative fast rail options along the east coast of Australia. It states:

> Current north-south freight infrastructure (road and rail) is constrained and this will increasingly impact negatively on broader transport network performance and freight productivity. The Melbourne to Brisbane inter-capital freight task is currently dominated by road comprising an estimated 100 000 truck trips per annum. In contrast, rail transport provides the opportunity to remove 161 trucks for every train between Melbourne and Brisbane and minimise network congestion.

Under the proposed development of this north-south freight infrastructure initiative, greater access between producers, markets and ports will significantly improve regional development and prosperity through greater market efficiencies. This will be achieved as the rail route between Brisbane and Melbourne moves inland with stops at major distribution hubs located in Toowoomba, Inglewood, North Star, Moree, Narrabri, Narromine, Parkes, Stockinbingal, Wagga Wagga, Albury and Seymour. The key objectives of this development in providing greater market efficiencies are specified as follows:

> Existing north-south freight infrastructure impacts regional producers and industries access to efficient supply chain networks, inhibiting productivity and economic growth. The east coast regional rail network, in its current state, reflects a legacy of poor alignments and inadequate investment, limited capacity and low productivity, rather than a purpose-built highly productive rail freight network (ATRC, 2015, p. 8).

The project and the use of innovative funding options as demonstrated in Parkes, provides options for the development of business hubs in locations such as Toowoomba as the gateway for the extension of this project to Central and North Queensland in further opening markets and providing further economic benefit.

2. THE INLAND RAIL PROJECT

In this section, the Australian Inland Rail project is examined as an exemplar for linking regional and rural locations with the cities of Brisbane and Melbourne, with potential future expansion into central Queensland. The objectives of developing infrastructure to enhance the agriculture supply chain and the funding options for these projects are important components in expediting market development and delivery. This

objective provides a platform to examine more thoroughly whether this project may be extended further into northern Queensland; this will aid in developing the necessary infrastructure to service the agricultural markets of its mid and northern regions.

The development of the Inland Rail project stems from the evolving idea of strategic infrastructure links between rural and regional towns and cities. The Australian Track Rail Corporation sets out the key benefits very specifically, including efficiency gains, environmental developments and improved safety, benefiting the broader community in several key ways:

- Improved linkages within the national freight network by creating a rail linkage between Parkes in New South Wales and Brisbane.
- Providing a connection between Queensland and the southern and western states.
- Building access to and from regional markets with two million tonnes of agricultural freight attracted from road, with a total of 8.9 million tonnes of agricultural freight carried on Inland Rail improved reliability and certainty of transit time with less than 24-hour rail transit time between terminals in Melbourne and Brisbane and reliability matching current road levels.
- Increased capacity of the transport network with an additional rail path for freight. Along with releasing capacity for passenger services in Sydney and Brisbane, removing 200000 truck movements from roads each year.
- Improved sustainability and amenity for the community with more than 750 000 fewer tonnes of carbon and reduced truck volumes in 20 regional towns (Australian Track Rail Corporation 2015:10).

The extent of emerging reform will result in the transition in transport market share in 2013-14 from 74% road and 26% rail, to 62% rail and 38% road by 2049-50 is a key outcome of this project (PricewaterhouseCoopers, 2015). This will improve supply chain options, which Chandra and Grabis (2016) highlight, and decision-making among supply chain stakeholders. This has in turn led to the development of more efficient transportation options. While the above benefits are important, the cost of improvement and economic efficiency must be justified in the allocation of government funding of megaprojects. The Commonwealth of Australia (2010), in conjunction with the Australasian Railway Association, set out the key benchmarks to be addressed in the development of a national inland railway strategy. Figure 1 summarises the improvements that the Inland

Rail will deliver at the expected commencement date of operation in mid-2025.

A further imperative has evolved over the last 12 months, which has redirected government funding to prop up the Australian economy as part of its response to the Covid 19 pandemic. This event will negatively impact government revenues for over a decade and projects like the Inland Rail will have to find alternative funding sources. Value capture will fast emerge as important as a directly hypothecated revenue source that contributes to funding through the increase of surrounding values generated from the uplift in unearned increments of value.

Table 1. Comparative Review of Initial and Revised Logistics. Source: ARTC, (2015).

Logistical Development	**2008**	**2025**
Train Lengths (Freight)	1300 to 1500 m	3600 m (up to)
Track Length (Nth/Sth line)	1200 km	1700 km plus upgrades
Capacity	Single stack container	Double stack container
Speed (Ave)	68 kph	110 kph
Melbourne to Brisbane	Over 36 hrs / 89% reliability	Under 24 hrs / 98% reliability
Maximum Crossing Time	15 minutes	20 minutes
Median Dwell Time	20.9% of total journey time	Less than 10% of journey time
Regional hub development	4	11

3. LITERATURE REVIEW: VALUE CAPTURE FUNDING

The Inland Rail project is one of the largest rail developments in Australian history, with the cost estimated at AUD$9.7 billion (ARTC, 2015). More than half of this cost will be funded from revenues generated from the project itself, with additional revenues required to fully fund the project yet to be determined. The idea of value capture is one of the key approaches to be considered as a co-funding source of large-scale

infrastructure projects. The objective of the government and private firms working together to build value through supply chains achieved in large-scale transport infrastructure projects is a foundation on which that uplift in value may be captured. Cao *et al.,* (2010, p. 6614) define "supply chain collaboration (SCC) as being two or more autonomous firms that form long term relationships and work closely to plan and execute supply chain operations towards common goals." When this relationship is supported by an infrastructure that provides the purpose on which such relationships are built, the basis of value created becomes the foundation on which value capture is applied.

The concept of value capture was highlighted in the introduction as the recovery by the public of the land value increments generated by actions other than the landowner's direct investments. This concept is reviewed further in this section; however, its application to the Mass Transit Rail Corporation (MTRC) in Hong Kong and Inland Rail in regional Australia is founded on the Von Thunen principle. Von Thunen determined that the orderly formation of land was established based on the demand for the produce from that land plus the cost and time required to transport that produce to markets (Dotzour *et al.,* 1990). In the case of both Hong Kong and Australia, this principle applies to intermodal business hubs and new transport infrastructure that facilitate this objective through value capture.

Value capture is particularly relevant in times of rapid urbanisation and where such uplift in property value may be generated by indirect causal changes in value generated from population growth (O'Brien, Pike and Tomaney, 2018, p. 3). These causes might be defined as intangible as they impact value resulting from policy changes that increase demand for land rather than any physical change generated by a service or infrastructure. Traditionally in Australia, existing recurrent land value taxation approaches such as state land tax and local government rates are used to capture these more subtle factors that drive increases in values (Mangioni, 2016).

In other cases, such as the Inland Rail project, value uplifts are generated by tangible infrastructure projects which, as a secondary result, generate population growth and further add to demand for land prompted by such growth and job generation. Connolly and Wall (2016, p. 161) support this idea, stating, "Improvements in transit increase accessibility to jobs and schools, and easily accessible locations tend to command higher prices." Ingram and Hong (2012, p. 3) state that while value capture may be thought of as a subset of land tax, Chapman (2017) suggests that where "public investment" promotes specific uplift in land values, value capture may be more specifically targeted over and above increases in organic value

growth. The uplift in value is further defined by Chapman (2017, p. 33), accounting for items that specifically include "demographic factors, regulations and infrastructure investment."

In contrast, Roukouni and Medda (2012) highlight that value capture is more commonly applied by government where a specific project or service is employed, and the potential for revenue may be directly attributed to that service and earmarked to fund the project itself. This definition is supported by Zhao and Larson (2011, p. 320), who define value capture as a benefits-received contribution in which infrastructure improvements are used to fund and pay for such improvements by those that benefit from the infrastructure. Smolka (2013) adds that local authorities in Latin America find greater flexibility in approaches that are applied on a project-by-project basis in contrast to those applied using broad city-wide fiscal instruments.

The use of value capture in the broadest sense, referred to as valorisation by Reyes (1980), has been applied to roads and bridges and can be traced back to the 1500s in Spain and Portugal and to the 1600s in Mexico. Its application has often been via a fee paid by all owners of land who benefit from the works, also referred to in England as a betterment levy, an impost used to fund the development of canals along the Lea and Thames rivers in the 1800s (Reyes 1980). On the matter of the diversity of value capture mechanisms, Gielen *et al.,* (2017, p. 126-127) define the mechanisms as being direct and indirect instruments, negotiable and non-negotiable developer obligations, private and public land assembly and land development embedded approaches.

More recently, Mathur and Smith (2013) note that value capture concepts are enjoying a resurgence in the United States in attempts to expand and involve stakeholders and beneficiaries of increases in land values surrounding transport infrastructure projects. The use of leasehold interests in the planning phase of projects, including the Contra Costa Centre (CCC) Transit Village in California and the Bethesda Metro on the fringe of Washington, have generated 7 per cent and 6.4 per cent, respectively on gross revenues (Mathur and Smith, 2013, p. 330). In qualifying the success of the Washington-based project, it is stated that the authority, the Washington Metro Area Transit Authority (WMATA), was formed to oversee the development effort and to develop links with private partners to directly manage the real estate development process from which project revenue was raised (Mather and Smith, 2013, p. 328).

In another model, the London Cross Rail was co-funded primarily through a Mayoral Community Infrastructure Levy collected as a fixed

amount per m^2 area of new construction (Greater London Authority, 2012). This form of value capture passes the cost of the levy onto the landowner/developer, who benefits from the uplift that results from the rezoning of the land and payable at the time the development is approved and subject to approval. To date, this levy had not been imposed on an existing property, a point of contention currently between government and developers.

Hong Kong has applied a successful rail funding value capture model, an approach developed over the past two decades that not only funds rail projects but also returns a social dividend to government and reduces the need for funding from the consolidated revenue of central government (Aveline-Dubach and Blandeau, 2019). The strength of this approach has been that it harvests the successful integration of multiple actors in the development and operation of transport infrastructure projects (Roukouni *et al.,* 2018). In this regard, Wang *et al.,* (2020, p. 4) define the factors that have supported the evolution of value capture schemes in Hong Kong that mitigate forestalling lengthy and litigious holdouts of a land assembly for building supply chain capacity through new infrastructure. The ability to assemble and adjust interests in land and to develop a clear, accountable and transparent framework for applying value capture from land-based income forms the basis for the co-contribution of stakeholders benefiting from the infrastructure.

The strength of Hong Kong's approach is defined by Aveline-Dubach and Blandeau (2019, p. 3418) as having a "clear procedure to ensure transparency and accountability", a measure yet to be adopted in many of the value capture projects applied internationally. While a temporal void has existed in the use of value capture for some time, Zhang and Xu (2017:, p. 2) state that value capture as a funding tool has made a significant resurgence over the recent few decades in both developed and developing countries. This paper makes its contribution by defining how value capture and the approach developed in Hong Kong (and elsewhere) may be adapted and applied in Australia to the development of the Inland Rail project. In adding to the existing literature, this paper examines the value capture approach and the options applied in Hong Kong through interviews conducted with the MTRC. This insight defines the reforms needed in Australia to develop a framework that will facilitate a value capture approach and make a greater contribution to funding future rail infrastructure projects into regional and rural Australia.

4. RESEARCH APPROACH AND METHODOLOGY

In researching options for bridging funding shortfalls in the anticipated project costs of the Inland Rail, a desktop review of international large scale rail projects was undertaken. The Hong Kong and Mainland China MTRC project was selected for two reasons. The first reason was that Hong Kong applied an integrated rail and property model, funds for which could be clearly defined as resulting from measurable uplifts in the value of surrounding development. This innovative model is founded on the principle of sharing the 'value uplift' derived from changes in the value of the land or airspace rights above or around railway line stations that benefit from the infrastructure.

The second reason for selecting the MTRC model for comparison was its adoption as a world-renowned exemplar for funding large scale rail projects from the uplift in value used to subsidise, or partially subsidise, revenue shortfalls in largescale projects. The project, which was built in Shenzhen, China by the MTRC, won the 2013 International Business Model Award of the International Association of Public Infrastructure. At the award ceremony, the project was defined as follows:

> The rail plus property development business model has been successfully implemented in Hong Kong as a means to internalise the added external economic benefits along the railway corridor for subsidising railway construction and operations. The business model has substantially relieved the burden on the government and released more public funds for other social welfare uses. Under this business model, the property development rights of some stations or depot-associated sites are bundled with the railway project. With the development profit generated from these developments, the return of the railway project is able to increase to a commercially viable level. (International Association of Public Transport, 2013, p. 3).

To gain insight into the use of the Hong Kong Railway/Property Model, the author visited Hong Kong in October 2018 as a guest of the MTRC to undertaking several interviews and presentations. The trip spanned two days (the schedule is provided as Annexure 2). In preparation for this visit, the author and the MTRC developed a strategic plan of key study areas that included information on the strategic funding model and on revenue sources, which involved meetings and interviews with each of the relevant departments. Finally, interviews with the property management and

development division of the MTR Corporation provided insights into the details of both recurrent and capital cash flows of their rail and property business model. Of further relevance to this paper was the government's rationale to develop a freight rail line between mainland China and its major market in Hong Kong between 1950 and the 1980s. The freight rail infrastructure rapidly advanced the development of regional mainland China and built the capacity and demand for moving rural produce to Hong Kong and exporting its manufacturing.

The overarching objectives of the meetings and interviews included the following points that relate to rail infrastructure development and funding options with outcomes that may be applied in Australia:

Research Questions	**Outcomes: Opportunities for Funding Inland Rail**
1. How was freight rail and the rail property model developed and how did it assist regional China in building supply chain capacity with the Hong Kong market?	Define the benefits of Inland Rail in building an agriculture supply chain between regions, cities and ports in Australia?
2. What are the value capture options for raising income from freight and passenger railway development lessons from Hong Kong?	What are the value capture options that may be applied in co-funding Inland Rail in building supply chain capacity in regional Australia, and what reforms are needed to facilitate value capture?

5. FINDINGS AND DISCUSSION

In addressing the research questions, the interviews with MTRC established the rationale to expand the rail network between mainland China and Hong Kong. This supports the rationale to develop the Inland Rail in Australia and its potential expansion into central and northern Queensland. As a means of co-funding this project, the second question addresses the value capture options used in Hong Kong, and how these may be adapted to fund Inland Rail. This, in turn, opens discussions of the broader reforms needed to use value capture more effectively in Australia. A summary of the key points from the interviews conducted with MTR

Corporation is included in Annexure. Reference to these interviews informs the discussion that follows.

Freight and Passenger Rail in Hong Kong: Opportunity for Funding Inland Rail

The initial cost for governments of funding large scale infrastructure often outweighs the immediate financial return. The returns for the Hong Kong Government were stated during interviews to be both social and financial, and they were amortised across decades rather than years. During Britain's lease of Hong Kong and the New Territories (1898-1997), railway freight lines were developed to transport produce from mainland China to Hong Kong, accounting for some 99 per cent of the total tonnage consumed by Hong Kong. Mainland China was historically the food bowl for Hong Kong's rapid industrialisation from 1950 to the 1980s, as well as its progressive urbanisation from 1990 to the present (MTRC, 2018, Pers. comm). The primary growth in port activity, however, was from the export of manufactured goods *from* Hong Kong.

The cooperation between Britain and China grew as the Hong Kong Government resumed control of the Kanton Rail Corporation (KRC) and developed the rail system, with Britain supplying the knowledge and locomotives. During the earlier stages of rail development between Hong Kong and China, the approaches to value capture were geographically spread compared with the more vertical, or high-rise, approaches that are now applied in cities and regional hubs. The approach developed in Hong Kong was through planning and reservation of land used as railway sidings; an approach introduced by the English during their tenure of Hong Kong and New Territories. Sidings represent land excess to the railway line itself and are generally acquired for railway-related purposes, including the initial construction of the infrastructure and subsequently for warehousing and storage, distribution, rail services and more recently, for retail purposes (MTRC, 2018, Pers. Comm). These uses and approaches could be considered in the planning for the Inland Rail and its potential extension and funding along with its intermodal business hubs.

To date, the focus of the Inland Rail in Queensland has been its southern region; this is quite separate from the infrastructure developed for emerging mining-related transport projects over the past three decades. The investment in freight rail to transport agricultural produce from regional Queensland to the ports of Brisbane and potentially Townsville has been identified as increasingly important to the economic development

of central Queensland (Louw, 2003). The case for expanding and sharing the benefits of the Inland Rail with central and northern Queensland is supported by an emerging and compelling rationale that has moved beyond the tradition of coal mining for export markets (McCalla, 1983). As a diversification from the extraction and exportation of coal (Queensland's second largest export), beef (Queensland's eighth largest export) and now its new emerging agricultural produce (Department of Foreign Affairs and Trade (DFAT), 2020), requires more diverse transportation options.

The increase in the volume and value of international food consumption is stated by KPMG (2019) as a megatrend set to confront this generation. The KPMG study found no less than $3 billion in unmet global demand across ten markets, most located in South East Asia. Five priority products were identified, namely beef, avocado, macadamia, on-shore aquaculture and soybean, as potentially creating a hub of employment and revenue:

> Transitioning land use and strategic efforts to embrace the five priority products was estimated to result in a positive Net Present Value of up to $271.1 million and generating approximately 2000+ new jobs within the region (KPMG, 2019, p. 3).

Negatively impacting the agricultural market of north Queensland is the lack of supply chain infrastructure, of which freight rail, road and ports are defined as being inefficient. Queensland accounts for more than 40 per cent of all beef production in Australia; seven of the ten largest cattle regions in Australia are located in Queensland.

As highlighted in this section, demand for agricultural produce was the basis for the development of freight rail between regional China and Hong Kong. The rail system was initially a loss-leader, with a majority of capital funding being received from government's consolidated revenue until more expansive value capture was developed as a primary funding mechanism (MTRC, 2018, Pers. Comm). A similar rationale could exist in Australia for agricultural produce to be transported between its regions, cities and emerging international markets, with rail one of the modes of transport to shipping and airport terminals. Future demand for more produce and the use of intermodal terminals between Brisbane and Gladstone via an Inland Rail route could be possible. This has been identified as the next step for Inland Rail once the Brisbane-to-Toowoomba section is complete and emerging demand in the medium term is monitored (Aecom, 2020).

Value Capture Options for Finding Inland Rail: Lessons from Hong Kong

The parity between the MTRC and Inland Rail provides rail infrastructure for an agricultural supply chain between regional intermodal terminals and cities. The MTR Corporation and Hong Kong model is supported for two reasons, the first being its integrated rail and property model, which utilises leasehold interest of land around its business hubs. As highlighted in the methodology section, this resulted in the rail/property model being awarded the 2013 International Business Model Award of the International Association of Public Infrastructure. The second factor supporting the Hong Kong Model is the New South Wales government appointment of the MTR Corporation as 60 percent stakeholder in the Northwest Rapid Transit (NRT) Consortium. This contract covers major parts of the design, construction and financing of this rail project, as well as the operation and maintenance of the line (MTRC, 2014). The development and operation of the Hong Kong Rail model was considered to be second to none in New South Wales engaging the Hong Kong model.

The economic foundation of the MTRC model is predicated on the Von Thunen principle, which observes that the most valuable land is a market-determined phenomenon and aggregated by land use relative to the location where produce would sell (Wolverton, 2004). Von Thunen determined that the orderly formation of land value was based on the demand for the produce plus the cost and time to transport that produce to market. The development of transport infrastructure incorporating intermodal terminals promotes land use and increases the land values, a concept that underpins the impost of value capture.

The present MTR Business Model comprises a multi-purpose rail and property construct where the uplift in value derived from the provision of rail infrastructure and approval to develop enhances the value of the land around and airspace rights above rail stations, service yards and business hubs. The MTR Corporation creates development rights for either residential, retail or industrial use land around stations, and the right to develop land and airspace is sold off to developers. Developers pay a premium to the MTRC for the right to undertake that development as well as a fixed price on the basis of either a $ per m^2 of gross building area for office or industrial land. In the case of residential development, a $/unit within a residential development envelope is paid. The MTRC retains the station retail and or surrounding business use space that may include distribution use around stations and collects rent generated from these

tenancies (MTRC, 2018, Pers. Comm). A summary of the sources against the various uses and the basis on which they are determined are as follows:

Table 1. Station Revenue Sources. Source: MTRC (2018) (Pers. Comm).

Infrastructure revenue sources	Revenue $/unit basis
The residential development is sold off by the developer who pays a land premium development to government and shares the profits with the MTRC	$/residential unit site
Surrounding land uses are either wholly owned by the MTRC or co-owned with a property trust.	$/m^2 airspace or ground rent paid on the leased space
The station retail/industrial land is retained and wholly owned by the MTRC, which collects and retains the rents.	$/m^2 paid rent paid by tenants for direct retail/industrial leases
The MTRC co-owns the railway system with the Hong Kong government and collects and keeps the fare-box revenue.	Rail rider revenue is collected by MTRC and used to fund operations
The recurrent profit of the rail/retail operation is split between the government and the MTRC and pays a dividend to shareholders	MTRC pays a share of profit to the government and a dividend to shareholders

After examining value capture options applied in Hong Kong and their potential application to Inland Rail in the north, the author selected Parkes as an example of how intermodal regional hubs may benefit and contribute to the agriculture supply chain. Hong Kong also provides an example of further reforms that may be adopted based on the MTRC model that would assist in raising revenue through value capture options. Parkes is one of several planned major Inland Rail stops and logistical hubs between Brisbane and Melbourne and is suited for value capture as a revenue source in co-funding this project. The Inland Rail feasibility study undertaken in 2015 identified Parkes as the juncture for the NorthWest link between Port Brisbane with Adelaide and eventually Perth (ARTC, 2015). This expansion plan requires the development of additional logistical transport terminals, as well as distribution hubs along its planned alignment. The planned expansion of Parkes includes land acquisition for potential use as rail sidings to generate additional revenue to co-fund the project. The increased demand for land to support the logistical distribution hub would include warehousing and storage, a rail servicing centre and a wholesale

distribution complex. In contrast to a rail/retail/residential mix in Hong Kong, land use along the Inland Rail alignment is more likely to incorporate a rail/retail/industrial mix.

Figure 2 below shows the planned rail/retail/industrial mix in Parkes as a framework for the stages of the intermodal hub development within the total Inland Rail project. This encompasses value capture as a component of the value uplift, for which a number of options are used, including the sale and leasing of land.

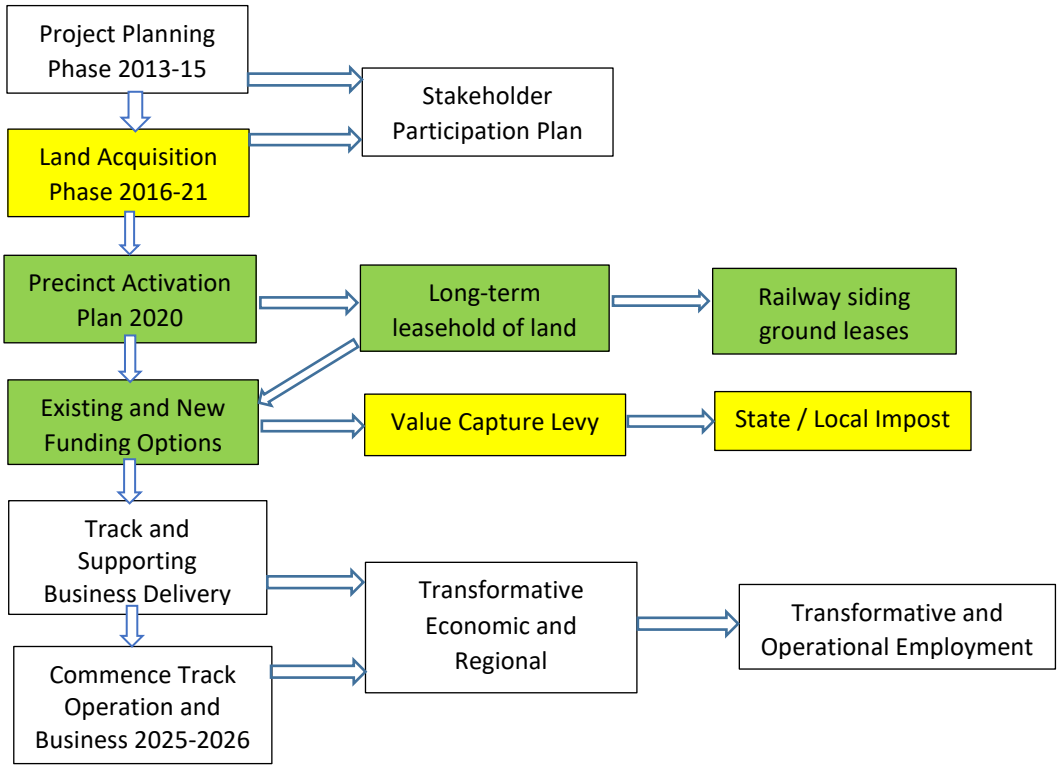

Figure 2. Inland Rail Project Delivery and Value Capture Funding Framework. Source: the Author.

As can be seen, railway siding land acquired by the ARTC is leased to logistics companies, typically over a 25-year term, with options for renewal. The 25-year term gives the business operator time to write off the leasehold cost of the building, also known as a fixed asset. This write-off is achieved through depreciation allowed under the Commonwealth's

Income Tax and Assessment Act 1997. This arrangement gives business operators the required timeframe to amortise capital expenditure across the life of building improvements while generating a rental return for the Commonwealth government through ground rents paid for the lease of the land on which intermodal business hub buildings are developed.

An additional source of revenue generated in Hong Kong and the New Territories around intermodal hubs is derived from advertising and telecommunication leasing rights. Transit advertising currently operates in Australia through companies such as Billboards Australia and GoTransit; however, an additional revenue source is generated by the Hong Kong government and paid by the MTRC, which leases advertising space in Hong Kong. In Australia, revenue is usually captured through income taxes paid by the advertising companies that lease the ground on which signage is developed, as is the case in Hong Kong. An additional levy is imposed by the Hong Kong government as a super-rent assessed on the annual rental value of the ground lease (MTRC, 2018, Pers. Comm). In Australia, this would be assessed on the land or site value used to assess land tax and is a deductable expense against income. Ground rents in New South Wales are commonly set as a fixed percentage of land value determined annually.

In the case of Parkes, advertising revenue would be a sub-set of value capture generated through the value of the infrastructure itself. As retailing is a use within the Parkes Precinct Activation Plan, advertising would be a potential revenue source to be generated from the project. In Figure 2, this is set out in the state/local impost. This source of revenue has traditionally been assumed to be reflected in land value taxation; however, in the concept of value capture, this potential source of revenue is identified as a separate impost.

In summary, while value capture may manifest itself in several forms, these forms of revenue are yet to be fully conceptualised and developed in Australia. It is this void in policy and application that underpins reference to the construct of the MTRC approach. This approach encapsulates project management from planning to operation and management of the revenue from the project, which is addressed in the following section. Based on this work, in Figure 2, the void in project delivery and value capture framework is shown as a subset and referred to in Figure 3, where it highlights the limitations and areas to be further developed in Australia. This development would build on the breadth and depth of value capture funding achieved by the MTRC to fund supply chain infrastructure in Australia and the basis for these reforms is set out in the following section.

6. REFORMS FOR PROGRESSING VALUE CAPTURE IN FUNDING SUPPLY CHAIN INFRASTRUCTURE IN NORTHERN AUSTRALIA

Opportunities exist to expand Inland Rail into Central and Northern Queensland and to northern ports through value capture applied along the existing and future Inland Rail alignment. The Toowoomba Enterprise Hub and surrounding precinct, similar to Parkes, is a strategic point that would help fund the expansion into Central Queensland. In addition to being a major rail stop along the Inland Rail alignment, Toowoomba is close to the Wellcamp business hub and adjoining airport. The InterLink Global Logistics Centre features a 3km frontage along the existing West Moreton rail line, the route of the Inland Rail, and an open-access intermodal terminal offering rail, road, sea and air transport options to improve supply chain efficiency (Toowoomba and Surat Basin Enterprise, 2017).

Wellcamp Airport has 70 domestic daily passenger flights and an international freighter service. It provides access and opportunities for communities, businesses and organisations across Southern Queensland, improving the liveability of the region, and facilitating investment and business opportunities (Toowoomba and Surat Basin Enterprise, 2017). The combination of Inland Rail and a regional airport is an example of how multiple modes of transport may build capacity as an inland gateway, in this case, to Central Queensland. These opportunities need to be geographically expanded through central Queensland with intermodal business hubs in ports such as Gladstone. McCalla (1983, p. 27) recognised close to four decades ago that industry evolves to meet the demand for produce when transport infrastructure is developed, citing international demand for coal from 1955 in Queensland. Louw (2003) adds that the need for integrated transport adaptable for produce, minerals and a range of export goods is needed across Queensland.

Queensland is the second largest exporter of goods (excluding services) in Australia, only second to Western Australia. Queensland's goods are the most diverse in Australia, with Western Australia's main export being iron ore. Queensland's diversity of export goods is the most rapidly evolving, comprising coal 44 per cent, natural gas 17 per cent, minerals 12 per cent and beef 7 per cent; these goods account for 80 per cent of the states total exports (DFAT, 2020). With increasing exports to be channeled through its main three ports of Gladstone, Brisbane and Townsville, public concerns are mounting with projected increases in coal passing through Brisbane to its port via Inland Rail (Commonwealth of Australia, 2020).

With Gladstone the largest port by export volume in Queensland, a compelling case exists for the expansion of Inland Rail north from Toowoomba into central Queensland and to the Port of Gladstone. In managing Queensland's increasing international demand for produce, the focus of Inland Rail should be equally focus on exports as well distribution of Australia's imports and equally across all of the eastern states.

Since Toowoomba is an emerging transportation gateway to Central Queensland, its housing market is one of Queensland's stronger regional performers, recording a median price growth of around 20 per cent in five years to the end of 2020 and was one of the strongest of all major regions in 2020 (Real Estate Institute QLD (REIQ), 2020). Mackay, coupled with Gladstone, recorded the highest annual median house price hikes for the state (5.9%) (REIQ, 2020). Swanson (2017, p. 5) highlights that in addition to increases in the value of industrial land around the city of Toowoomba, the demand for industrial warehousing, cold room and distribution centres is also likely to grow in the years ahead. What remains to be employed is the facilitation of value capture from land value increases. These markets are among the options for value capture to apply where increases in value align with the value uplift derived from the expansion of Inland Rail in Toowoomba.

The need for state and Commonwealth government to work together in deriving new forms of revenue such as value capture in funding infrastructure projects has never been more important. Figure 3 shows a framework that applies a hybrid tax transition from the Commonwealth government to sub-central government because of the increase in value in line with the increased value of surrounding properties and developable air space rights. This uplift in value becomes assessable (and can be collected by the state government) when demand for increased development is generated by new infrastructure and rights are granted to develop land as part of that infrastructure. In each case, the revenue collected is retained by that level of government. In the case of an annual levy on fully developed surrounding property, this may also be offset against Capital Gains Tax (CGT), creating a divested and shared tax base (Mangioni, 2019).

This arrangement is shown in Figure 3, where the Commonwealth as the collector of CGT grants a tax concession to the taxpayer for payment of a local or state government development contribution or a tax based on the uplift in value of land around the new development. Of further note in Figure 3 is that the state government, as the tax collection agency collects the tax revenue directly from the infrastructure project that has impacted the property value on which value capture taxes are assessed. This creates tax hypothecation by linking the tax to an expenditure of the tier of

government that dually develops the infrastructure and collects the fiscal dividend through value capture taxation. The splitting of commonwealth CGT promotes tax cooperation between the tiers of government, the tier that provides the infrastructure and the tier that grants the right to develop surrounding land uses.

A driver of the framework is the rationale for the tax trigger mechanism in Figure 3 that enhances the economic efficiency of the tax. The framework brings forward the revenue-raising trigger from a tax imposed at the point of value creation, rather than at the deemed acquisition of land when the value crystallises through a sales transaction. In other words, the trigger improves the economic efficiency of the tax impost because the value capture tax is applied at the point of creation of value rather than at the point of transaction.

Government Action	**Value Capture** Airspace/Land Sale	**State** Land Value Tax Tax hypothecation	**Council Rates** Land / Property Value Tax	**Capital Gains** Non-hypothecated Tax
New Infrastructure				
Investment / Business Use Land Tax Trigger	Development Approval * ⟺	Annual VCL*	Annual	Disposal
Increased development rights of private underdeveloped land	↑ Commonwealth and sub-central governments share the tax base ↑			
Sale of government land	N/a	Annually only if leased privately / land becomes taxable in private ownership		Not on sold by government
Valuation Methodology	A before-and-after methodology is applied on a property-by-property basis, showing the land value before and after gazettal and the increase in the Floor Space Ratio or land value before and after announcement/completion of the infrastructure.			

Figure 3. Value Uplift Revenue Impost Framework. Source: Mangioni (2019).

7. CONCLUSION

This paper shows that the roll-out of major infrastructure linking regional Australia with cities through transportation and logistical distribution hubs provides economic benefits to those regions. In return, regions may also contribute financially to these projects through dividends to the community

via the options that share the benefits from land-based profits. Using the MTRC's rail/property model and its evolution between Hong Kong and mainland China, the case is made for rail development projects to supplement roads between the regions and major cities of Australia. In this paper, the national Inland Rail project uses the logistical distributional hub of Parkes in New South Wales, setting the example for co-contribution from land-based revenue sources, a project that will yield similar economic results across the various intersections and distributional hubs throughout the eastern states of Australia. The emerging demand for freight rail between southern and central Queensland and the case for expanding the Inland Rail are defined by a number of factors, including the need over the past 25 years to upgrade existing rail infrastructure and the need to bring produce to markets more efficiently. Toowoomba, with its access to freight rail, airport and an intermodal business hub, is defined as a gateway to Central Queensland. The shortfall in funding identified for Inland Rail in the initial funding strategy has deepened over the past year as the government has directed funding to Australia's economic recovery from the Covid pandemic. This, therefore, increases the need for additional imposts such as value capture taxation, not least because these values will increase in line with the long-term demand for land uses that evolve to support transport infrastructure.

It is further argued that while value capture has been dormant in recent decades in Australia, its use in abroad provides a framework for its resurgence through more articulate and defined approaches supported by cooperation between tiers of government in Australia. The Inland Rail provides an opportunity for the government to work with stakeholders in developing hypothecated funding options during the planning and activation stages of the project. The land value uplift and the profit-sharing framework developed abroad are adaptable in Australia for supply chain infrastructure projects. In achieving this objective, governments in Australia will need to work across their various tiers to adopt and implement land assembly and to plan and fund options through a number of measures that include tax policy, allowances and amortising across project operation periods. It was noted at the beginning of the paper that the Commonwealth government is the primary funder of Inland Rail. Through the better alignment of government taxes, the sub-national government stands to make a greater contribution through value capture triggered by planning decisions that accommodate land uses generated by demand from large scale infrastructure projects.

Further options exist to apply value capture in Central Queensland by raising existing land value taxes, including recurrent state land tax and

local government rates. Among those that are particularly worthy of consideration would be spreading the impost to residential properties that increase in value in towns and regions that are themselves beneficiaries of increases in value directly attributed to transport infrastructure projects.

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Annexure 1: Interview summaries for points set out in the methodology and framework

Questions	Interviewee and Position
How was freight rail and the rail property model developed, and how did it assist regional China in building supply chain capacity with the Hong Kong market?	Strategy and Planning Manager. Sr. Manager - Media and Business Development Manager - Station Retail.
Summary of feedback	
Hong Kong served as the main port for the import and export of China's mainland freight since the early 1950s. In 2000 the Kowloon-Canton Railway (KCR) was the freight arm of the government and estimated to move between 500,000 and 700,000 twenty-foot equivalent unit (TUE's) by 2010 and up to 1.80 million TUE's by 2020. China now has seven of the ten largest ports in the world by volume with Hong Kong moving from the largest and busiest in the world to ranked sixth largest in 2018. The role of freight development accelerated the advancement of regional China and New Territories by moving goods and food to and from mainland China through Hong Kong. In the 1950s, there were five goods trains each day in each direction. By the late 1970s, there were twenty goods trains in each direction, which vastly improved the demand and strengthened local markets on mainland China. There are several options for revenue-raising within the structures of freehold and leasehold interests in land and airspace above and around railway stops. Leasehold: Rental from access-ways, stratum, retail or industrial space, advertising and parking. Freehold: sale of development rights and betterment levies. Of importance in developing a funding strategy is the planning and executing the acquisition of the land required for infrastructure and associated uses. This step may take a decade to conclude for land assembly, which in contrast to airspace rights above railway land, may be achieved through changes in planning regulations. Establishing the correct balance between sale and rental of assets will impact the return and longevity of the project and its upkeep.	
Questions	**Interviewee and Position**
What are the value capture options for raising income from freight and passenger railway development lessons from Hong Kong?	Senior Manager – Operations Development Manager of Finance and Communications and Development Manager - Station Retail
Summary of feedback	
The consent arm of the government removes any planning risk through the predevelopment of a precinct master plan sought by MTRC that provides certainty for the development that is built around the infrastructure project. The developer has	

certainty and their developer profit split provides a return on capital investment to MTRC that is partly paid as a dividend to shareholders on the Hong Kong Stock Exchange and a profit share is paid to government as a return for the right to develop. The MTRC capital value is 25% private of which that component is floated on the stock exchange. The 75% ownership is retained by government which takes a profit margin of the same proportion. The MTRC also collects the station retail rents or industrial depot rents depending on the type of development that surrounds the railway station development.

Market feasibility studies on a case by case basis are determined with a base line developed for the infrastructure the cost of infrastructure and gross developable plan determined. Civil development companies will tender for the construction works of the infrastructure. Private development companies with tender for retail/commercial/residential development component. A standard land premium rate per dwelling or Gross Building Area m2 for depot development is paid to the government for the right to develop and a profit share arrangement is offered to the MTRC by the developer. The tender is determined on the profit share split, which commands the most efficient form of development in line with demand for the land use in the market place.

Key points distilled from MTRC interviews and visit during 2018

Value capture was progressively introduced in the 1950's for freight and 1990s for passenger rail taking pressure off government budgets for capital infrastructure investment and expediting rail projects.

Combined government-private sector partnership in rail roll-out vastly improved the financial progressivity of the regions of the New Territories of Hong Kong and China since 1950's.

The land acquisition and site assembly phase is achieved by negotiation and the use of land swaps, maintaining the longevity of businesses impacted by acquisition and removing long-standing holdouts by impacted owners.

The private sector is best placed to adapt, develop and operate surrounding intermodal business hubs and retail uses and managed these operations more efficiently than the government.

Annexure 2: Authors 2018 MTR Corporation meeting interview and presentation schedule – Hong Kong

Program / Activity	Venue	Presenter / Interview
Day 1 – 4 Oct 2018		
(Head of Operations Strategic Business Management)	Telford Plaza MTR HQ	Greeting by MTR General Manager
Overview of MTR Business	Telford Plaza MTR HQ	Senior Manager – Operations Development
Introduction of Light Rail Operations in HK	Telford Plaza MTR HQ	Operations Manager-LR and Bus
Break		
Introduction of Mainland China and International Business in MTR	Telford Plaza	Strategy and Planning Manager
Lunch		
Introduction of MTR Malls portfolio and latest Mall Development	Telford Plaza	Chief Shopping Center (East) and Communications Mgr
Travel to Kowloon Station - Elements		
Visit at Elements (Shopping Mall located at Kowloon Station, Tung Chung Line and West Kowloon Terminus)	Elements Shopping Centre	Chief Marketing Manager
Day 2 – 5 Oct 2018		
Financial Management in MTR HK	Telford Plaza	Manager of Finance
Lunch		

Program / Activity	Venue	Presenter / Interview
Introduction of Station Commercial Business in MTR HK (Advertising and Telecommunication Revenue)	Telford Plaza	Sr. Manager - Media and Business Development
Introduction of Station Commercial Business in MTR HK (Station Retail)	Telford Plaza	Comm and Dev Mgr-Station Retail
Travel from Kowloon Bay to Hong Kong Station		
Site Visit of Station Retail Business (Hong Kong Station) Assembly location: Hong Kong Station	Hong Kong Station	Manager - Station Retail,
End		

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